Collaborative Research:
Curriculum Development for Digital Library Education

http://curric.dlib.vt.edu/DLcurric.html
Presentation in May 1, 2006
Project Teams/NSF Grant

• Project Team at VT (IIS-0535057):
  – Dr. Edward A. Fox (fox@vt.edu)
  – Seungwon Yang (seungwon@vt.edu)

• Project Team at UNC-CH(IIS-0535060):
  – Dr. Barbara Wildemuth (wildem@ils.unc.edu)
  – Dr. Jeffrey P. Pomerantz (pomerantz@unc.edu)
  – Sanghee Oh (shoh@email.unc.edu)
Development / Evaluation Process
January 2006 – December 2008

- From research team (VT & UNC)
- From current courses at VT & UNC
- From Advisory Board
- From CC 2001

- CC 2001 context
  - Curricular needs
  - Student background

- Specific strengths
  - Specific weaknesses

- Modules ready for use
  - Lessons ready for use

- Inspection by Advisory Board
- Inspection by external experts
- Inspection by Doctoral Consortium participants

- Modules
  - Lessons

- Teacher perceptions
  - Student perceptions
  - Student outcomes

- At UNC & VT
- At additional universities (in CS & LIS programs)
## Project Timeline

<table>
<thead>
<tr>
<th>Activities</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation of an advisory board</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement of experts to assist with module development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of modules</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of lessons within modules</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of 1- and 2-semester courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preliminary evaluation of modules and lessons by experts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revision of modules and lessons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of modules and lessons in existing courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation of modules and lessons in the field</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offering of new courses at UNC &amp; VT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JCDL conference and Doctoral Consortium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECDL &amp; SIGIR conferences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIS&amp;T conference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICADL conference</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Experts

## Table 3. Experts (all have agreed to assist)

<table>
<thead>
<tr>
<th>Advisory Board</th>
<th>VT</th>
<th>UNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dan Atkins, U. Michigan</td>
<td>Steven Edwards, CS</td>
<td>Catherine Blake, SILS</td>
</tr>
<tr>
<td>Christine Borgman, UCLA</td>
<td>Roger Ehrich, CS</td>
<td>Laura Gasaway, Law School</td>
</tr>
<tr>
<td>Lillian Cassel, Villanova</td>
<td>Weiguo Fan, ACIS</td>
<td>Jane Greenberg, SILS</td>
</tr>
<tr>
<td>Michael Christel, CMU</td>
<td>Steve Harrison, CS</td>
<td>Stephanie Haas, SILS</td>
</tr>
<tr>
<td>Raya Fidel, U. Washington</td>
<td>Gail McMillan, Library</td>
<td>Brad Hemminger, SILS</td>
</tr>
<tr>
<td>Richard Furuta, Texas A&amp;M University</td>
<td>Chris North, CS</td>
<td>Thomas James, Dean, School of Education</td>
</tr>
<tr>
<td>Elizabeth Liddy, Syracuse University</td>
<td>Manuel Pérez-Quinónez, CS</td>
<td>Paul Jones, Director, ibiblio; SILS &amp; School of Journalism &amp; Mass Communication</td>
</tr>
<tr>
<td>Clifford Lynch, CNI</td>
<td>Naren Ramakrishnan, CS</td>
<td>Diane Kelly, SILS</td>
</tr>
<tr>
<td>Kurt Maly, ODU</td>
<td>Deborah Tatar, CS</td>
<td>Gary Marchionini, SILS</td>
</tr>
<tr>
<td>Javed Mostafa, Indiana</td>
<td>Layne Watson, CS</td>
<td>Montek Singh, CS</td>
</tr>
<tr>
<td>Tefko Saracevic, Rutgers</td>
<td></td>
<td>Natasha Smith, Library</td>
</tr>
<tr>
<td>Linda Smith, UIUC</td>
<td></td>
<td>Helen Tibbo, SILS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steve Weiss, CS</td>
</tr>
</tbody>
</table>
What we do:

- Identify, develop and test educational modules, guided by
  - 5S framework
    - (Ex) Module revision in 3/27/06
  - Analysis of DL course syllabi
    - (Ex) UNC-CH is collecting DL syllabi
      - VT collected syllabi from DELOS member institutions in Europe
  - Experts
  - Computing Curriculum 2001
5S Framework

5S captures the entities and medium involved in digital libraries.

- **“Societies”**
  - Both software “service managers” and fairly generic “actors” who could be (collaborating) human (users).

- **“Scenarios”**
  - System states and events, but also can represent situations of use by human users (or machine processes, yielding services or transformations of data).
5S Framework

- **Spaces**
  - 2D and 3D interfaces, GIS data, representations of documents and queries.

- **Streams**
  - All types of content (as well as communications and flows over networks, or into sensors, or sense perceptions)

- **Structures**
  - Organizational schemes (including data structures, databases, and knowledge representations)
## 5S Examples

<table>
<thead>
<tr>
<th>Ss</th>
<th>Examples</th>
<th>Formalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streams</td>
<td>Text; video; audio; image</td>
<td>Sequence (list)</td>
</tr>
<tr>
<td>Structures</td>
<td>Collection; catalog; hypertext; document; metadata</td>
<td>Graph, Function, Relation</td>
</tr>
<tr>
<td>Spaces</td>
<td>Used in indexing, browsing, and searching services – as well as interfaces</td>
<td>Set (vector, topological, measurable, measure, probability spaces)</td>
</tr>
<tr>
<td>Scenarios</td>
<td>Searching, browsing, recommending</td>
<td>States, events, sequences (lists)</td>
</tr>
<tr>
<td>Societies</td>
<td>Service managers (software), Actors (learners, teachers, etc.)</td>
<td>Tuple (relating events and actions)</td>
</tr>
</tbody>
</table>
STREAM
1. Collection Development
   - Digitization
   - Document and E-publishing Markup
   - Harvesting
2. Digital objects/Composites/Packages
   - Text Resources
   - Multimedia streams/structures, Captures/representation, Compression/coding
     • Content-based analysis, Multimedia indexing
     • Multimedia presentation rendering

STRUCTURE
3. Metadata, Cataloging, Author submission
   - Thesauri, Ontologies, Classification, Categorization
   - Bibliographic information, Bibliometrics, Citations
4. Architecture (agents, buses, wrappers/mediators), Interoperability
Module Revision 3/27/06

SPACE
5. Spaces (conceptual, geographic, 2/3D, VR)
   - Storage
   - Repositories, Archives

SENARIOS
6. Services (searching, linking, browsing, etc.)
   - Info needs, Relevance, Evaluation, Effectiveness
   - Search & search strategy, Info seeking behavior, User modeling, Feedback
   - Routing, Filtering, Community filtering
   - Sharing, Networking, Interchange
   - Info summarization, Visualization

SOCIETIES
7. Intellectual property rights management, Privacy, Protection (watermarking) (ILS)
8. Social issues / Future DLs
9. Archiving and preservation integrity (ILS)
What we do:

• Each module will include
  -. Lesson plans
  -. Concept maps
  -. Recommended reading list
  -. Demos / online resources
  -. Exercises and quizzes

And they will be developed during this summer…
What we do:

- Course Development (summer 2006)
  - 1-semester and 2-semester courses will be based on the developed modules

- Courses and modules will be...
  - Evaluated by experts
  - Pilot-tested in CS and LIS courses by the U.S. institutions and our international collaborators in India (Dr. Chakraborty) and Brazil (Dr. Torres).
## Dissemination Efforts

<table>
<thead>
<tr>
<th>Conference</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCDL 06</td>
<td>Curriculum Development for Digital Libraries (paper)</td>
<td>Accepted</td>
</tr>
<tr>
<td>ETD Symposium 06</td>
<td>Digital Library Curriculum Development: Enhancing Education and Comprehension of NDLTD (paper)</td>
<td>Accepted</td>
</tr>
<tr>
<td>ECDL 06</td>
<td>Collaborative Research: Community-Oriented Curriculum Development for Digital Library Education (poster)</td>
<td>Submitted</td>
</tr>
</tbody>
</table>
JCDL ’06 Paper

• We’ve manually classified and analyzed:
  Conference Proceedings
    -. JCDL ’01 - ’05: 354
    -. ACM DL’96 - ’00: 189
  Magazine articles
    -. D-Lib magazine ’95 – ’06: 521
  Conference session titles: 264

• Total 1,064 papers and 264 session titles were classified against revised modules.
• Most popular topics were architecture, services, and social issues
ECDL ’06 Poster

- DL-related course syllabi were collected from DELOS member institutions in Austria, Czech Republic, United Kingdom, Switzerland, Norway, and Germany.

- English resources (reference papers, textbooks, online demo, etc) were then retrieved from the syllabi and organized as papers, textbooks, and online documents and tutorials.
Links to Resources

Excel files and DL educational resources taxonomy.

- Corpus Table Download Link
  http://curric.dlib.vt.edu/DLcurric/syllabiCollection/European/v1/EuropeanDLCourseCorpusTable-v1.xls

- Textbook Analysis Table Download Link
  http://curric.dlib.vt.edu/DLcurric/syllabiCollection/European/v1/EuropeanDLCourseBookAnalysisTable-v1.xls

- Reference Paper Analysis Table Download Link
  http://curric.dlib.vt.edu/DLcurric/syllabiCollection/European/v1/EuropeanDLCoursePaperAnalysisTable-v1.xls

- Online Documents and Tutorials Analysis Table Download Link
  http://curric.dlib.vt.edu/DLcurric/syllabiCollection/European/v1/EuropeanDLCourseOnlineDocTutorialsAnalysisTable-v1.xls
Taxonomy of DL Educational Resources

- Course Material
  - Projects
  - Exercises
  - Tests
  - Presentations
  - Textbooks
  - Reference Papers
  - Tutorials

- Other Material
  - Videos
  - Journals
  - Conference Proceedings
  - Technical Reports
  - Syllabi

- Software
  - Toolkits
  - Other Modules, Components, Routines
  - Institutional Repository Systems
  - Other Digital Library Systems
  - DSpace
  - EPrints
  - Fedora

- Interactive Sources
  - Demos
  - US Institutions
  - European Inst.
  - Asian Institutions
  - Oceanic Institutions
Questions?
News and Interviews

- WVTF Public Radio: Morning Edition, "Interview with Dr. Fox" [January 30, 2006]
- VT Collegiate Times article [January 26, 2006]
- UNC Gazette article [January 25, 2006]
- Virginia Tech Computer Science Department News article [January 23, 2006]
- Virginia Tech News article [January 20, 2006]